

RECORD, Volume 22, No. 3*

Orlando Annual Meeting
October 27–30, 1996

Session 132PD

Use of Derivatives by the Insurance Industry

Track: SOA Research
Department/Investment/Financial Reporting

Key words: Investments, Financial Management, Financial Reporting

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Recorder: WARREN R. LUCKNER

Summary: The SOA has cosponsored a research project on the use of derivatives by the insurance industry. The research was conducted at Georgia State University, using annual statement data reported by insurance companies to the NAIC. This session presents the results of the study. Implications of the results of this research with respect to sufficiency of risk-based capital levels will also be considered.

Mr. Warren R. Luckner: I work in the research department at the SOA. Because the panelists have much to present, I will only provide background and some quick observations on the research.

This research is of interest to many different constituencies, as evidenced by the groups that provided funding and support. Funding was provided by: the Center for Risk Management and Insurance Research and the Center for Policy Research,

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both at Georgia State University; the Bankers Trust Company; the CAS; and five groups within the SOA—the Investment and Life Insurance Company Financial Reporting Sections, the Committee on Life Insurance Research, the Subcommittee on Finance Research, and the Committee on Knowledge Extension Research. The staff of the NAIC provided support in collecting the data. The project oversight group was chaired by Sam Cox, who is Professor of Actuarial Science at Georgia State University and editor of the new *North American Actuarial Journal*. The first paper based on this research is going to be featured in an article in the inaugural issue of that journal, which is scheduled for publication in January 1997.

I'd like to thank the researchers for assembling this panel and Zain Mohey-Deen, a research actuary at the SOA. We're pleased to have a combination of actuaries and nonactuaries to provide perspective on the research. So as to not interrupt the flow of the presentations, I'll introduce all the panelists at this time.

Rich Phillips is an assistant professor of risk management and insurance and a research associate in the Center for Risk Management Insurance at Georgia State University; David Cummins is the Harry J. Lohman Professor of Insurance and Risk Management at the Wharton School at the University of Pennsylvania. David, during the time of this research, was also the Victor L. Andrews visiting scholar at Georgia State University. David also serves as the executive director of the S.S. Huebner Foundation for Insurance Education at Wharton. Rich and David will present the results of the research to date.

The third member of the research team was unable to attend this meeting. Professor Stephen Smith is the H. Talmadge Dobbs, Jr. chair of finance at Georgia State University. During the course of the research, all three researchers were visiting scholars at the Federal Reserve Bank of Atlanta. Lucien Burnett is senior managing director in charge of insurance risk management coverage at the Bankers Trust Company. Lucien will provide the perspective of an investment banker. Tom McAvity is vice president of Asset/Liability Management at Allstate Life and will provide the perspective of a life insurance company investment department. Finally, we have Larry Gorski who is life actuary at the Illinois Department of Insurance. He will provide the perspective of a state insurance department regulator.

In my view, one of the most important aspects of this research is that it provides an opportunity for the SOA to be involved in another type of experience study. It's a good illustration of the motto of the SOA, which is from John Ruskin, "The work of science is to substitute facts for appearances and demonstrations for impressions." It's also a good example of what I consider a general description of the work of the actuary, which is to identify, quantify, and manage risk and uncertainty to the

benefit of society. As a member of the research department staff, I'm particularly pleased that we were able to participate in this research, which is supported not only by both the CAS and the SOA, but also by a number of nonactuarial organizations and the academic community, thus providing an opportunity for the actuarial profession to interact with and strengthen relations with such organizations and the academic community. Finally, as a caution, six words: *Orange County, Barrings* and, for those of you who are long-time practitioners in the field of derivatives, *Proctor & Gamble*.

Mr. Richard D. Phillips: I want to tell you a bit about what we are doing at Georgia State and what we are trying to learn. This is a major research project that will span a number of years and we've really only scratched the surface so far. The first paper you have encompasses what I will call the first stage of the project. The overall goals of the research are to find out what insurers are doing with derivatives, why they're using them, and what is the effect on the risk-and-return trade-offs that they are trying to manage.

The first stage of this project was to construct a database of derivative transactions by insurance companies. The insurance industry is unique in the sense that a company must report in excruciating detail any transaction they make in derivatives. This presents the insurance industry with a unique opportunity to study why firms manage risk. Banks manage risk and manufacturing firms manage risk, but it's very difficult to study what these other firms in other industries are doing because the form in which these companies must report their derivatives transactions is very aggregated. The insurance industry, on the other hand, must report every position that is opened, every transaction that is closed, and any position that remains open at the end of the year. What we've done thus far is to construct a database of derivative transactions from the 1994 annual statements filed with the NAIC. That database contains more than 40,000 derivative transactions by the industry.

The second stage of this project will be to identify the users of derivatives to get an idea of which companies are using derivatives, what they look like, and what are the characteristics of companies that take the leap and start employing derivatives in their investment strategies. That is the paper we are going to discuss here.

The third stage, which we've just begun working on now, seeks to determine the extent to which insurance companies use derivatives. Why do some insurance companies just dabble in derivatives while other companies use them with great intensity? This portion of the project is ongoing as I speak, assuming my graduate assistant showed up for work.

Stage four of this project will investigate what is the effect of using derivatives. In my opinion, this portion of the project will address the most interesting question: given that a firm is using derivatives, does it make an impact on the profitability of the firm or the solvency position of the firm? Currently there exists only anecdotal evidence that addresses this question. There has not been an objective study, at least in the academic literature that I am familiar with, that addresses this question and no report demonstrates that a company using derivatives can achieve a greater risk/return trade-off than one that avoids using derivatives. We hope to successfully investigate this issue.

Now let's move on to discuss rationales for derivatives usage. We could spend an entire semester talking about the rationales for managing risk within any company, including insurance companies. Let me just discuss a few of them briefly. There are some major reasons academics think firms should manage risk. I have divided those rationales into two groups: shareholder maximization hypotheses and managerial motivations.

The first hypothesis under the shareholder maximization group suggests firms will manage risk to avoid the costs of financial distress. I am defining financial distress as an increased threat of bankruptcy. When firms approach bankruptcy (insolvency) various costs will increase that the firm might otherwise not have to incur. These include increased regulatory and oversight costs, costs imposed by policyholders through a decreased price that they're willing to pay for your products, etc.

Also related to shareholder maximization is costly external finance. It's another reason that firms may want to manage the volatility of their net income streams. There is a large amount of empirical literature that suggests that raising capital external to the firm, that is, through the capital markets or through a bank, is more costly than it is to generate these funds internally. Therefore, reducing the volatility of your net income streams will provide a higher probability that there will be enough retained earnings available to fund future investments. This should increase the value of your firm because using these cheaper internally generated funds, rather than having to go to the external capital markets, will increase the profit margins in the company's products.

Taxes generate a number of reasons why firms have an incentive to manage their net income streams. For example, firms that face a convex or a progressive tax schedule can reduce their expected tax liability by reducing the volatility of their net income.

The second major grouping of rationales is managerial motivations. I have listed managerial risk aversion as a motivation for doing derivatives, although some

people may argue that managerial risk aversion is a reason to not do derivatives. However, if we can agree that derivatives can be used to diversify risk, then risk-averse managers have a motivation to use them. In addition, those managers that have a large investment in undiversifiable firm-specific human capital have an incentive to use derivatives. To the extent that derivatives provide managers a cheaper way to manage risk, managerial risk aversion is a reason to adopt and not avoid derivatives as part of their investment strategies.

Signaling managerial skill is another motivation that management may have to use derivatives. To the extent that the market uses corporate earnings announcements as a signal of the quality of the management to identify profitable investments, derivatives can be used to ensure that these announcements are within the bounds that the markets expect them to be.

Let's discuss some insurer-specific rationales for derivatives usage. There are many reasons that you have probably heard discussed in previous SOA meetings or that you may have already implemented within your own firms. For example, derivatives can be used to hedge the cost of debt capital for your firm. They can be used to manage foreign currency risks that your firm may have an exposure to from foreign derived profits or from the assets or liabilities of the company. Derivatives can be used extensively to manage the convexity risk inherent in a portfolio of single premium deferred annuities (SPDAs). Some firms, primarily property and casualty companies, have tax incentives to generate cash instead of capital gains. Derivatives can be used to take advantage of this tax incentive by selling call options. Selling (writing) call options essentially sell the upside potential (capital gain) of an equity investment to generate income. Finally, there are also regulatory and surplus management rationales for using derivatives.

Now on to the database. The database consists of all insurance companies that submitted their 1994 annual statements to the NAIC. That list includes approximately 1,200 life/health insurers and 2,000 P & C insurers and represents 98% of the industry's assets. With affiliated companies grouped, this represents 1,400 groups and unaffiliated singles.

Using this data set, we can begin to answer the question of who is using derivatives. The first answer to that question is that the largest firms of the industry are using derivatives. Of the top quartile of companies, measured by asset size, 38% of life insurance companies report some derivatives activity on their annual statements. For the P & C companies, it is about 20%. When we combine all the subsidiaries of a company into one observation unit, we find that approximately 35% of such groups are using derivatives. The penetration of derivatives strategies into the smaller companies are not very substantial. However, one interesting and unex-

pected result from the study is that there are quite a few P & C companies that use derivatives. Our prior observations, based primarily on anecdotal case studies, suggested that derivatives activity was the primary domain of life/health insurers and not P & C companies. Thus, we were somewhat surprised to find about an equal number of derivative users in the two industries.

What types of derivative contracts are being used? Table 1 displays the total notional amount of option contracts that P & C insurers and life/health insurers purchased during 1994.

TABLE 1
1994 USERS OF DERIVATIVES, BY SIZE

	Life/Health	Property/Casualty	Groups
Q1	0.66%	0.58%	1.69%
Q2	0.66	3.29	3.93
Q3	8.28	3.49	9.55
Q4	38.08	20.16	34.83
All Firms	11.93%	6.88%	12.51% 1423
Number of Insurers	1207	2063	178
Number of Users	144	142	

From Table 2 we can see that P & C insurers tend to focus their derivative activities on purchasing call and put option contracts on equities. The life/health insurers tend to be investing primarily in interest rate caps and floors and also hedging interest rates through the purchase of bond call and put options.

Table 3 shows the total notional amount of option contracts insurers are writing, as opposed to purchasing. In a sense, these numbers represent short positions in these contracts rather than the long positions I showed you in Table 2.

In Table 3 we see that the P & C companies are writing a substantial number of equity call options. By selling these equity calls, P & C insurers are probably generating cash up front by selling the upside potential of the underlying equity. The life/health insurers are primarily hedging interest rate risk by writing many bond calls and puts. However, we also see a significant number of firms that are writing some equity call options.

TABLE 2
PART A—FINANCIAL OPTIONS PURCHASED DURING 1994

Underlying Asset/Risk	Life/Health Insurers		P&C Insurers	
	Number of Users	Total Notional Amount (000s)	Number of Users	Total Notional Amount (000s)
Bonds				
Calls	21	\$ 5,004,427	4	\$ 429,041
Puts	15	7,494,675	—	—
Caps	1	600,000	1	3,700
Equities				
Calls	11	1,403,632	17	768,887
Puts	11	938,673	32	1,488,350
Foreign Currency				
Calls	1	50,000	2	37,027
Puts	1	294,894	2	109,651
Floors	1	54,846	—	—
Interest Rates				
Calls	4	279,914	—	—
Puts	7	3,324,720	—	—
Caps	17	10,300,256	1	212,787
Floors	8	6,602,407	—	—
Corridors	1	89,000	—	—

TABLE 3
PART B—FINANCIAL OPTIONS WRITTEN DURING 1994

Underlying Asset/Risk	Life/Health Insurers		P&C Insurers	
	Number of Users	Total Notional Amount (000s)	Number of Users	Total Notional Amount (000s)
Bonds				
Calls	16	\$143,266,621	11	\$ 59,200
Puts	14	10,346,437	—	—
Equities				
Calls	32	2,615,563	72	9,688,798
Puts	8	141,129	12	108,953
Foreign Currency				
Calls	2	222,840	2	222,840
Puts	2	91,500	2	610,662
Interest Rates				
Calls	1	200,000	—	—
Caps	4	2,282,661	—	—
Floors	1	141,352	—	—

Table 4 shows you the notional amount of swap, forward, and collar positions that were opened during 1994. These contracts are traded in the over-the-counter (OTC) market. The life/health insurers are the primary participants in this market, although property and casualty insurers display a good deal of activity in the foreign currency forwards and swaps market. The primary activity of the life insurers is concentrated in interest rate swaps.

TABLE 4
PART C—SWAPS, FORWARDS, AND COLLARS OPENED DURING 1994

Underlying Asset/Risk	Life/Health Insurers		P&C Insurers	
	Number of Users	Total Notional Amount (000s)	Number of users	Total Notional Amount (000s)
Bonds				
Forwards	2	\$ 178,518	—	—
Commodities				
Forwards	1	814	—	—
Swaps	4	60,493	—	—
Equities				
Swaps	3	236,467	3	\$ 261,718
Foreign Currency				
Forwards	18	26,935,808	19	5,309,932
Swaps	6	584,888	5	2,627,904
Interest Rates				
Collars	4	1,610,000	—	—
Swaps	55	25,144,777	7	311,584
Mortgages				
Swaps	2	84,954	—	—

Table 5 reports the total notional amounts of futures contracts traded during the year. Futures are standardized contracts traded on organized exchanges. Here we see a many bond futures positions, especially for the life insurers. The P & C insurers are primarily trading equity futures—mostly futures contracts written on the Standard & Poor's (S & P) 500.

Now I'm going to let my colleague from Wharton finish.

Mr. David J. Cummins: Table 6 shows the OTC counterparties. There are two ways to trade derivatives. One is by doing it OTC, by having one of the investment banks create a deal that's specifically tailored to your needs. The second way of doing it is over an organized exchange. The conventional wisdom is that there's somewhat more credit risk if you deal with an OTC type of transaction, although with the bigger firms, there's probably not much. What we've found is that the three top firms are Goldman, Morgan Guaranty, and Bankers Trust, although there are quite a number of others. Table 6 shows 15, but we found up to 50 and maybe

a few more counterparties. There are some foreign firms, like Deutsche Bank, Credit Suisse, and some others that were down the list.

TABLE 5
PART D—FUTURES CONTRACTS OPENED DURING 1994

Underlying Asset/Risk	Life/Health Insurers		P&C Insurers	
	Number of Users	Total Notional Amount (000s)	Number of Users	Total Notional Amount (000s)
Bonds				
Long	38	\$ 37,649,420	4	\$ 234,719
Short	37	24,413,399	9	3,187,503
Equities				
Long	6	127,350	7	501,993
Short	4	384,662	12	3,455,493
Foreign Currency				
Long	1	982,090	4	301,973
Short	2	3,071,655	3	37,762
Interest Rates				
Long	4	4,346,163	—	—
Short	4	29,980,314	4	1,945,387

Table 7 shows the exchange counterparties. Reflecting the trading of options that Rich mentioned, we find the Chicago Board of Trade (CBOT), the Chicago Board of Options Exchange, and the New York Stock Exchange as the top ones, and that's not really surprising. We're focusing strictly on financial derivatives, so we're not talking about the CBOT catastrophe options.

TABLE 6
INSURANCE INDUSTRY OTC COUNTERPARTIES: YEAR-END 1994

Rank	Counterparty	Number of Companies Using Counterparty	Total Notional Amount Outstanding (000,000s)	Percent of Total Industry OTC Notional
1	Goldman Sachs	35	\$11,661,000	33.5%
2	Morgan Guaranty	29	11,583,000	33.3
3	Bankers Trust	36	11,359,000	32.6
4	Salomon Brothers	45	6,277,000	18.0
5	Merrill Lynch	49	5,461,000	15.7
6	Prudential Bache	10	4,982,000	14.3
7	UBS Securities	15	4,942,000	14.2
8	Lehman Brothers	23	4,505,000	12.9
9	Gen Re Financial	17	3,018,000	8.7
10	Morgan Stanley	29	2,740,000	7.9
11	Credit Suisse	27	2,037,000	5.9
12	Citibank	16	2,018,000	5.8
13	Deutsche Bank	14	1,724,000	5.0
14	First Chicago	15	1,684,000	4.8
15	Rep Nat'l Bnk-NY	2	1,680,000	4.8

TABLE 7
INSURANCE INDUSTRY EXCHANGE COUNTERPARTIES: YEAR-END 1994

Exchange	Number of Companies Using Exchange	Total Notional Amount Outstanding	Percentage of Total Industry Exchange Traded Notional
Chicago Board of Trade (CBOT)	36	\$6,814,000	61.1
Chicago Board of Options Exch.	31	2,340,000	21.0
New York Stock Exchange	13	1,015,000	9.1
NASDAQ	3	331,000	3.0
MATIF	1	232,000	2.1
Chicago Mercantile Exchange	4	194,000	1.7
LIFFE	1	71,000	0.6
American Stock Exchange	11	37,000	0.3
Options Clearing Corporation	1	19,000	0.2
Kansas City Board of Trade	3	15,000	0.1
Philadelphia Stock Exchange	5	9,000	0.1
Pacific Stock Exchange	3	5,000	0.0
American Opt Exchange	1	1,000	0.0
Tokyo Stock Exchange	2	—	0.0

Next we'll look at who the users and nonusers are along with their characteristics (Table 8). What we find first is that for P & C insurers, the users tend to have 19% invested in equities, whereas the nonusers have only 10%. This goes along with this idea of selling off your potential capital gains and converting them into income by selling a call on a stock you already own. That's probably motivated by tax considerations.

TABLE 8
USERS VERSUS NONUSERS MAJOR ASSETS CLASSES

Variable	Life/Health		Property/Casualty		Groups	
	Nonusers	Users	Nonusers	Users	Nonusers	Users
Total Assets (000,000s)	\$656.5	\$8,594.7	\$248.8	\$1,710.1	\$563.5	\$11,125.7
Stocks	7.5%	6.9%	9.9%	19.2%	9.3%	12.6%
Real Estate	6.2%	8.7%	1.6%	2.4%	3.9%	5.9%
PT Bonds	60.7%	55.5%	64.9%	61.6%	63.2%	58.0%
PP Bonds	2.4%	9.8%	0.9%	1.6%	1.3%	5.4%
Ave Mat. PT Bonds	7.67	9.84	6.36	8.05	6.78	8.92
Ave Mat PP Bonds	2.46	7.11	1.65	4.18	1.92	5.71
Cash + St Invs	6.8%	2.7%	7.6%	4.6%	7.8%	3.7%
All Other Assets	16.4%	16.3%	15.0%	10.6%	14.5%	14.3%

P & C insurers tend to hold more real estate if they're a user. P & C companies that use derivatives hold less publicly traded bonds, because they don't really have much liquidity risk for publicly traded bonds, but the users hold more privately placed bonds. Life insurers are the main private placement players, and life insurer derivative users have 10% in private placements and nonusers have only about 2%. We think they're following a liquidity risk management strategy.

Another interesting finding is the users have significantly less cash than nonusers, indicating that they're putting more of their money to work in higher yielding assets and managing the liquidity risk through the use of derivatives.

TABLE 9
USERS VERSUS NONUSERS PROPORTIONS IN MAJOR BOND CLASSES

Variable	Life/Health		Property/Casualty		Groups	
	Nonusers	Users	Nonusers	Users	Nonusers	Users
PT Industrial, Gov't, etc.	70.2%	54.3%	83.6%	79.5%	79.8%	66.2%
PT CMOs	11.3	18.1	5.6	8.6	7.1	13.7
PT Loan Backs	10.9	8.9	7.0	7.6	8.5	8.9
PT All Others	1.5	1.8	1.4	1.5	1.6	1.9
PP Industrial, Gov't, etc.	3.2	14.5	1.1	2.5	1.7	7.9
PP CMOs	0.1	0.5	0.0	0.1	0.1	0.4
PP Loan Backed Bond	0.3	0.8	0.1	0.1	0.1	0.5
PP Other Bonds	0.2	1.1	0.2	0.2	0.1	0.6

In Table 9, we have for users less publicly traded bonds and more collateralized mortgage obligations (CMOs). CMOs, of course, are instruments that have a fairly high risk of duration convexity and liquidity risk. So you're going to find more hedging if you hold the CMOs. There are more privately placed bonds and, again, this is a liquidity risk issue.

Table 10 shows the maturity type. Typically, the yield curve is going to be upward sloping, so you have higher yields on longer term bonds, and you might like to take advantage of that. The downside is more related to interest rate risk, because those bonds are more sensitive to changes in the interest rates. If you want to get the yield to protect yourself against interest rate risk, you may be using more derivatives. Across the board, in every asset category for both P & C and life companies, the maturity of the bond portfolios of users is much higher than the maturity of the nonuser's bond portfolio. A strategy you might adopt to get higher yields (to be more competitive) in the market for asset accumulation products is to go longer term and then hedge out the interest rate risk.

I think the most interesting story in the liability picture is for the life insurers (Table 11). Life insurer users have less group life and, of course, there's not much you can do to hedge the risk of group life, which is mainly mortality. Individual life insurance, though, includes a number of embedded options. Life insurer users have much more in GICs and much more in group annuities. What they're doing is hedging the risk of these interest-sensitive asset-accumulation products and some of the embedded options. Some of these contracts provide a floating rate payment that may be tied to some interest rate or index. Often these policies have minimum rate guarantees, which is like selling an interest rate put option to the buyer. And often

they have renewability options. All these embedded options then can be hedged out by use of derivatives.

TABLE 10
USERS VERSUS NONUSERS AVERAGE BOND MATURITY BY TYPE

Variable	Life/Health		Property/Casualty		Groups	
	Nonusers	Users	Nonusers	Users	Nonusers	Users
PT Industrial, Gov't, etc.	6.76	8.73	5.89	7.47	6.01	8.06
PT CMOs	6.02	10.16	4.31	7.01	4.81	8.60
PT Loan Backs	7.54	11.21	5.00	8.68	5.87	10.08
PT All Others	2.03	6.40	1.09	3.43	1.44	4.87
PP Industrial, Gov't, etc.	2.34	6.93	1.48	3.59	1.77	5.24
PP CMOs	0.83	4.82	0.13	1.42	0.39	4.28
PP Loan Backed Bond	1.13	5.38	0.34	0.97	0.64	3.70
PP Other Bonds	0.82	4.00	0.21	1.31	0.39	3.08

TABLE 11
USERS VERSUS NONUSERS MAJOR LIABILITY CLASSES

Variable	Life/Health		Property/Casualty		Groups	
	Nonusers	Users	Nonusers	Users	Nonusers	Users
Commercial Liability	—	—	21.9%	19.7%	12.4%	8.7%
Auto Liability	—	—	19.3	26.1	12.0	10.8
Auto Phys. Damage	—	—	4.7	5.7	3.1	3.1
Multiperil	—	—	14.9	14.3	12.2	5.5
Group Life	11.2%	4.5%	—	—	4.2	1.7
Individual Life	47.5	53.6	—	—	14.6	28.7
Group Annuity	1.7	6.3	—	—	0.5	3.7
GICs	0.4	5.2	—	—	0.2	2.6
Accident and Health	4.5	3.8	1.7	1.0	2.6	2.4

The only real way to find out what the effects of the individual variables are is to put them into a multivariate context (Table 12). So we use a probability model and the probability model has as its dependent variable "1" if the insurer is a user, and "0" if it's not a user. And then it's estimated by a nonlinear model using a normal distribution function approach. A plus sign means the variable has a tendency to push you towards being a user of derivatives and a minus sign pushes you away from being a user of derivatives. A main finding, which is not surprising, is that there are positive signs all the way across for assets. We interpret this as being that there are economies of scale, not so much in terms of the size of a company or portfolio, but in terms of human capital. You have to be big to afford to have some people who are just specializing in derivatives and to acquire that specialized expertise.

If we look at the swaps column, we find positive signs almost exclusively all the way down the swaps column; for example, there are positive signs for publicly traded bonds, for GICs, for CMOs, and also for maturities. What this is indicating is that life insurers are using these things to hedge duration gaps. If your duration gap of equity is positive or if you have a duration gap between your GIC portfolio, which is mainly shorter term, and your CMO portfolio, which is longer term, you can hedge this gap by use of derivatives. Likewise in publicly traded bonds, you're interested in managing interest rate risk. The two maturities of publicly traded and privately placed bonds indicate that the longer your maturities, the more you need to manage interest rate risk. You go about it by using derivatives. We also find swaps correlated with individual life reserves. Again, this is management of the embedded options that are present.

We do find reinsurance for life insurers to be positively related—that's the premium ceded variable—with writing options. This is contrary to what we find for property and liability insurers. This could indicate that life insurers are using derivatives as a complement to reinsurance to reduce risk, but it also could indicate that they're using reinsurance to sell off some of the insurance risk, and then writing options to take on some investment risk. At this point, based on just the aggregates, we can't distinguish between those two possibilities.

Let's move to the P & C probability run. Incidentally, Table 13 reflects individual companies. We also did it for group companies and the results are basically the same, because in a group you're probably going to have a group of derivative managers using the same things for the whole group. Again, we see a strong size effect. We see unaffiliated singles are more likely to use derivatives. We attribute this to the fact that if you have a group of insurers, in essence, you have the option to let one of those insurers fail without affecting the other insurers. I know there are reasons not to do that, but it still is a valuable option. If you're unaffiliated, you don't have that option. You may find more need to manage your risk in some other way.

An interesting finding for PC liabilities is the long-tailed commercial is negatively related to the use of options and swaps. We would appreciate from the floor some other explanation, but our reasoning is that if you're worried about interest rate risk, long-tail property and liability, in a way, serves as a natural hedge against your long-tail bond risk, because as interest rates go up, the market value of liabilities goes down, and so does the market value of assets. So it's a natural hedge. This doesn't work in life insurance because you have embedded options in your long-tail contract that the policyholder can exercise.

TABLE 12
DETERMINANTS OF DERIVATIVES USAGE—LIFE/HEALTH INSURERS

	Any Activity	Buying Options	Writing Options	Swaps, Forwards, and Collars	Futures	End of Year Counterparty
Log (Assets)	+	+	+	+	+	+
Real Estate				-		
GICs	+	+		+	+	+
PT Comm. Bonds				+		
PT Other Bonds	-					
PP Comm. Bonds						+
PP CMOs	+			+	+	
Ave. Mat. PT CMOs						+
Ave. Mat. PT Other Bonds	+	+		+	+	
Ave. Mat PP Comm. Bonds		+		+		
Ave. Mat. PP CMOs				-		
Group Life Reserves				+		
Ind. Life Reserves	+			+		
Group Annuity Reserves					+	
Premiums Ceded			+			+
Stock Dummy						+
Affiliated Member Dummy	+	+	+	+	+	+

We also find that auto physical damage is positively related to the use of derivatives. There are a couple of interpretations here. One is that auto physical damage, because it's short tail, is not a hedge against asset interest rate risk. Another interpretation is that the auto lines are relatively low in terms of underwriting risk, so maybe the insurer can take on more risk on the asset side through transacting derivatives.

We see that the ceded premiums variable is negatively related for profit and loss (P&L) insurers, whereas it was positively related for life insurers. The P&L insurers are using it as a trade-off against writing options, whereas the life insurers are using it in a complementary sense. This could indicate that the P&L insurers that are doing this maybe don't have much underwriting risk, so they don't use very much

in the way of reinsurance. Consequently, they can take more risk in the derivatives market to try to enhance their rate of return.

TABLE 13
DETERMINANTS OF DERIVATIVES USAGE—P&C INSURERS

	Any Activity	Buying Options	Writing Options	Swaps, Forwards, and Collars	Futures	End of Year Counterparty
Log (Assets)	+	+	+	+	+	+
Stocks	+	+	+			
Real Estate	+	+	+			
CMOs		+	+		-	
Ave. Mat. Other Bonds	+			+	+	+
Comm. Liability Reserves	-	-		-		-
Multiperil Reserves				-		
Auto Phy. Damage Reserve	+		+			
Premiums Ceded			-			
Single Unaffiliated Co. Dum.	+	+	+		+	
Affiliated Member Dummy	+	+	+	+	+	+
Stock Dummy		+			+	

The main message for life insurers is that they're managing interest rate risk, such as duration and convexity. We also find that they're managing liquidity risk—remember they're holding less cash than the nonusers. We find that they're hedging both asset risk and liability risk, since derivatives usage is correlated with GICs, with interest-sensitive life policies, with CMOs, and with long maturity bonds. Complementary relationship with reinsurance. There's some evidence of window dressing by mutuals; they'll do things during the year and then close them out by the end of the year, to a greater extent than stocks do because stocks are going to be disclosing their positions to the SEC and lots of other bodies that the mutuals don't have to report to.

The property and liability results present a different story. Whereas the life insurers are doing mostly interest rate risk management, the P&L insurers are using options to do things such as dividend capture, which means they're trying to get rid of capital gain risk, and capture the dividend only. There's also covered call strategies—selling off your capital gains in return for income. Again, these may be tax motivated. What's more important is exchange risk is being hedged here, and

reinsurance is negatively correlated. Auto physical damage and property and liability stock insurers are more likely to use derivatives.

The summary is that both life insurers and property and liability insurers are using derivatives, but for different purposes. The future work that we'd like to conduct involves seeing whether the use of derivatives has any effect on risk and return. There's a big debate in the academic community about whether it should have any effect. The pure market people say there's no effect. There was a paper presented at a conference at Wharton in June that said, for mutual funds, there's no effect on risk and return. We're interested to see whether there is in the life insurance area.

We want to look in more detail at the strategies employed. What we have now is very much of an overview. We don't know exactly what people are doing, so the next step is to do some actual interviews and find out more specifically what some of these strategies are. The final point is, we're going to have a conference where we're going to present the results of this paper plus the other two papers—the risk and return paper and the strategy paper—and then also have comments from regulators, investment bankers, and insurance company users. The conference will probably take place some time in spring 1997 I think in May, at Georgia State.

Mr. Lucien Burnett: I'd like to pose some of these observations from a more qualitative perspective. I've worked in the insurance industry for about six years at Bankers, and it has been a fun job. What is captured, but maybe not highlighted, is the concentration of the usage of derivatives. You will note that when you look at the total categories and the composition of the user within those total categories, a few users account for a very large percentage of the total amount of activity exercised by the entire industry.

Certainly as a marketer, we want that to change. We typically work with the larger institutions—there's more "bang" for the buck. It is our job to educate the community, and lack of knowledge is, without question, the biggest deterrent to greater use of derivatives for risk management purposes. When we look at the industry, then at those institutions that are active in the world of derivatives, we find there is often an individual who is the catalyst at the firm, and that individual is rather generic in terms of his or her qualities. The person is certainly very senior and is an individual that is quite comfortable making board presentations, but that individual also is incredibly technically sound, and, therefore, can deal with the "street" and not be intimidated. Under him or her will develop an organization that is well attuned to the use of derivatives and their applications and the tools. It doesn't get pushed up. It definitely drifts down. It will happen from just a maturation of the business as people who are the younger ones who are technically sound matriculate up into the higher ranks. Or it will happen because firms will

hire people like Peter Morris at the Equitable, who will come in with a fairly sound knowledge of opportunity, strategies, risks, and rewards. Sometimes that jump starts the derivative activity. While the numerical results of this research are revealing, when you look qualitatively, we can emphasize that it's often a jump start process in terms of institutions that do use and don't use.

That's one reason why we see certain insurance companies using them and certain ones not using them. Of course, size is a critical factor in terms of having the systems. You can have technical knowledge and then you must have money to pay for systems and systems have to be there and are as important as the technical knowledge. It's capitalizing it. It's very hard to start a program in derivatives usage when you look at the cost of the systems; you look at the cost of the statements in terms of the work that needs to be done. Who would want to do one derivative trade and suddenly have to start revving up their statutory Schedule DB? It has to be part of a much broader program.

A reason why insurance companies use derivatives is to mitigate risk as opposed to managing risk. It's very hard to decide between managing risk versus mitigating risk. If you talk about the risk that the insurance world is supposed to take to get return from risk, it can be duration, convexity, or liquidity. Liquidity can be both an asset and a liability. I think one asset that the insurance world is endowed with (that many of the other investment industries that compete with you don't have) is long liquidity. The insurance world pays a premium to buy liquidity. In many products, although not all, you pay a premium to know that you have funds to meet your claims and other obligations.

Often the investment markets tend to be more liquid than you need them to be. Therefore, you don't get the return for the premium that is paid to buy the funds in the first place. We see many institutions with private placements that will get paid a premium for selling some liquidity they just purchased. One of the first derivative activities of the insurance industry was asset swaps, the ability to take public bonds, those that are either denominated in foreign currencies or denominated with cash flows that don't necessarily suit the cash flow of the portfolio or of a particular contract that was written, and find other assets—a Honeywell Deutsche Mark bond or a Reed Publishing U.K. bond—and swap the currency cash flows. They take on counterparty credit risk, take on more liquidity risk, and possibly diversify asset risk by buying Reed Publishing, which maybe doesn't have U.S. bonds. But monetizing the liquidity return is one way that derivatives are used. You are giving up liquidity, but you're buying value and you're swapping the cash flows to the form that you want them to be.

We see \$35 billion in swaps to the life companies, of which the largest interest rate swap had maybe \$6 or \$8 billion. We see the industry jump from little micro-managed swaps to New York Life with 15 pages of swaps against specific assets. Some institutions do portfolio management swaps. We support it very strongly. We think it is mitigating risk. It is managing duration. The insurance world needs to go buy value when it's offered to them. Not when that value and the sector happens to match the most recent liability duration it just wrote. It's not going to work. You just can't do it. Value doesn't appear right when you need it. Typically, value appears when you least need it, and that's because everyone else needs it. So using duration swaps to manage overall portfolios is what we see some of the industry gravitate towards. It gives it more latitude to respond to value, even if the duration issues or the convexity issues don't happen to fit the program at the particular time. Caps and options are more common in the life industry. Five or six players dominate 90% of the market. Typically, of course, it's the biggest SPDA writers. They do typically take duration risk. They will look at their portfolio and go long duration because the yield curve may lend itself to such. Or they might go through a rigorous scenario testing that goes far beyond Regulation 126 to know that they're taking a risk for a hopeful expected positive return. They'll go through their own internal scenario testing and make sure that while they're making a risk statement, protective measures are in place to ensure that they still get adequate returns if they're wrong in those statements. That's why they're paying all the premium to smooth out their potential income volatility. The usage is far too concentrated because of the work of having to set up to do this.

More recent uses of derivatives include hedging the volatility of the income of separate account or variable annuity funds. It's interesting to read some annual reports that show what the income volatility or surplus volatility will be as a function of movement in rates. When one puts the equity market through the same stress test rigors, he or she might find institutions that have a huge amount of fee income that emanates from their variable annuity businesses. That fee income is a function of the net asset values under management. Even though many of these funds have been constructed to be somewhat close-ended so you don't lose your annuitants, just a pure value of the assets that are in there can be quite volatile, and a 10% drop in the net asset value, measured on a daily average basis in these assets, can have a huge impact on an insurance company's income statements.

We think that as a business practice, for a speculative purpose, you might want to put some floors on those asset values to stabilize your net income. Institutions are gravitating more towards equity-linked notes, something that Larry's going to address shortly. Is it to escape the capital charges? We hope, obviously, that's not the intent. There are many things going on to try to get capital charges adjusted.

Does it give them more price stability? Yes. Does it allow them to invest in certain asset classes on a pooled basis that they might not be able to manage themselves? Maybe they don't have an S&P stock fund manager or they don't have an outside manager. The notional amount of the structured assets that we see in the form of equity-linked notes or pens is probably 1% of admitted assets. That's a very small amount. And in a certain sense, you can argue, though I won't, that you are foregoing book income in many of these cases to buy these assets. That's conservative from one perspective. Price volatility certainly can be countered against that argument.

In terms of where we institutionally see the use of derivatives going, education is key. Fear is still rampant, and that's not healthy. We're doing things in our power, the "street" is doing things in its power to make the market more educated. Like any new asset class, educated consumers understand bid-ask. They understand how the value is constructed. They make you go through scenario testing. It's the same due diligence you would do for any other asset or liability that you would write. If the same rigors that are being done on the new equity-linked annuity products and the hedging requirements of the equity-linked annuity products were applied to SPDA products, we probably wouldn't be writing SPDAs.

We think also there's excess capacity. We saw 15 dealers. I think the derivative dealers of the world need to go through the same process the insurance world is going through, which is a consolidation. There's far too much capacity for demand right now. It has been capitalized, and therefore, for the buyer, the markets are incredibly tight. The cost of using derivatives, not as a risk outcome, but just the inherent cost, reduces the inherent profit margin in derivatives. It is incredibly, and somewhat distressingly, very tight. But it's something that can be proven with just due diligence and conversations about the bid-ask and the depth of these markets because they have grown immeasurably. I think they probably will shrink before they will grow more from the supply side.

Mr. Thomas A. McAvity: Rich and David have assembled a valuable database, tested hypotheses, and drawn interesting inferences from their analysis of the data. Their hypotheses draw more on the finance literature than on the subjective views of derivatives users. As a practitioner, I will talk about why and how I have used derivatives in an asset/liability management framework. These observations may help the research team enrich its investigation into why insurers use derivatives, how they should use derivatives, and how such use should be reported and regulated.

Like power tools, derivatives allow a skilled user to do constructive jobs more quickly, accurately, and economically; they should be used only by people with

suitable training within a set of disciplines to ensure that they do their intended jobs without adverse effects. Just as power tools should be used for suitable purposes in the context of a constructive project, derivatives should be used suitably by insurers in the context of asset/liability management.

Let's define asset/liability management (ALM)¹ as the process by which insurers use investment strategies, derivatives, and reinsurance to "manufacture" benefits for customers². The goals of the process are to create a time series of (1) benefits that are competitive and suitable for the customer, and (2) outcomes to the company that are desirable. Both goals must be met for a variety of economic scenarios that take risk explicitly into account.

The capacity for bearing risk is a scarce resource rooted in the insurer's capital structure. The management of risk in an ALM framework can be viewed not only as an issue of corporate risk management but also as an issue of manufacturing efficiency, where the concept of efficiency includes the optimal use of required capital to bear risk. To the extent that the NAIC and rating agency capital models gauge risk inaccurately, they induce noneconomic behavior by insurers; rather than motivating risk-minimizing strategies, they motivate model-minimizing strategies. More about this later.

Companies vary in the measures used and time horizons over which they evaluate prospective outcomes. Asset and revenue growth are important in achieving economies of scale and building brand acceptance. For a stock company, growth in GAAP earnings and operating income are often near the top of the list. Mutuals, free from the short-term concerns of securities analysts, may focus on safety, stability, and long-term value creation. Insurers must also ensure that expectations of rating agencies, distributors, regulators, and the press will be met in current and future periods.

In managing the outcomes of spread businesses, we take uncertainty explicitly into account by simulating results for various economic scenarios and examining the prospective profile of scenario results. Economic scenarios and "stress tests" allow for variation in interest rates, credit default and downgrade risks, other market risks, and mortality and other actuarial risks.

¹ While the main focus of ALM has been on investment spread businesses like annuity and GICs, the idea can be extended easily to all forms of insurance, other financial products, and other kinds of financial intermediaries.

² This concept applies to fixed and variable products, but in different ways. With fixed products, the insurer earns a spread between the return on the assets and the cost of the liabilities but must directly bear the risk. With variable products, the customer bears the direct risk, but the insurer may be at risk to high surrenders and to adverse experience on death benefits if the strategy performs poorly.

In an ideal world, we would create a risk-minimizing strategy that would allow us to credit desirable rates, cover expenses, and achieve target profits in every period for every economic scenario. This ideal is usually unattainable in today's competitive market. Although a low-risk, liability-replicating investment and hedging strategy won't meet profit targets, it is a useful first step in devising what we really want—an investment and hedging strategy that will produce an attractive profile of spreads and returns on required capital with minimum risk. Once it has been designed, it provides a base case against which we can explore how to achieve incremental spread and return by managing assets and liabilities for relative value, exploiting our liquidity profile, taking additional risk, and minimizing the effective aggregate risk through diversification. Specifying and pricing the liability replicating strategy also helps us to compare the effective cost of funds for different products and distribution channels.

We can construct such a strategy by matching the simulated liability benefits, accruals, and expenses over all scenarios with cash flows from high-quality investments (for example, generic investment-grade public bonds) accompanied by the derivatives required to hedge the market risks embedded in the liabilities (such as free partial withdrawal and surrender options). For a fixed cash-flow product like a GIC, such a strategy may be a simple one-period, buy-and-hold strategy. For most products, however, it is a multiperiod, rule-driven strategy in which the rules for investing new money and reinvestable cash, setting rates, and buying hedges are engineered to create stable margins. The pattern of annual profits from the strategy will not generally produce an attractive return on required capital. The challenge is to earn excess spread from a combination of sources in such a manner as to minimize the overall risk to outcomes.

Derivatives should be considered as alternative tools in using any of these sources of excess spread as well as to hedge the risks inherent in the liabilities.

Unfortunately, the emerging pattern of state regulation, the required capital formulas of rating agencies, and the changing pronouncements of the SEC, FASB, and IRS make some of these potential derivative solutions unworkable, and create a difficult gauntlet for proponents of a derivatives strategy. These difficulties drive many companies to use less efficient alternatives or simply to abandon the attempt to achieve an efficient asset/liability portfolio. On the other hand, we can be grateful that some solutions are permitted and allow us to achieve results that are desirable from an accounting, tax, regulatory, and economic perspective.

Increasing Spreads and Returns

The first source of excess spread and return on capital is active management using relative value analysis, that is, choosing the most attractive assets and liabilities. On the asset side of the balance sheet, we can achieve some of the benefits of active

management within a buy-and-hold style by being selective in what we buy and when we buy it. Subject to accounting and tax considerations, we can magnify the excess returns derived through relative value judgments by actively trading assets. By using relative value analysis to assess prospective return versus risk more accurately than other investors, we should be able to earn higher average spreads and returns than we could using an equivalent risky passive approach.

Some insurers have displayed superior capabilities to underwrite and manage portfolios of public and private corporate obligations. In recent years, Wall Street has introduced credit derivatives, which transfer the risk of default losses from one counterparty to another in return for a risk premium; they are often embedded in a structured note, providing an investment that has a risk reward profile very similar to a corporate bond. Sometimes, the risk transferor has a strong economic motivation to shed the risk and is willing to pay a higher premium than the premium embedded in bonds from the same or comparable issuers. Why should insurers not take advantage of opportunities to find value in credit derivatives? Does it matter whether the risk premium earned is embedded in a bond yield, paid explicitly in a credit swap, or embedded in a structured note? Substance should be recognized as more relevant than form: what matters economically is what risks we take, not what form we use to take them.

Relative value is also important on the liability side of the balance sheet. For a given product sold through a given channel, we can reduce the effective cost of investable funds (or, equivalently, the required spread on assets) by reengineering the product and rate-setting strategy and by creating new kinds of products in which we may enjoy a period of limited competition and a lead in acquiring market share and brand recognition. A good example of the latter is equity-linked annuities, which are created by combining equity options providing the upside participation with bonds whose cash flows support minimum guaranteed amounts, including estimated free partial withdrawals, surrenders, and death benefits.

We can also manage our products and distribution channels as a portfolio of spread businesses, seeking to optimize aggregate performance by applying both relative value analysis and diversification of risk. Some products are natural hedges for one another. For example, guaranteed renewable life insurance policies and life annuities are affected in the opposite direction by changes in the general mortality process, for example, epidemics or new cures for major diseases. Other products contribute to diversification less obviously by drawing on different sources of systematic risk. For example, the interest rate risk taken on with the embedded options in fixed deferred annuities can be diluted by issuing products that have no embedded interest rate options, such as GICs and structured settlement annuities.

Fixed cash-flow products also increase the capacity for the whole enterprise to make greater use of illiquid investments.

As Lucien noted, a second source of excess return is our ability to encumber our liquidity by using private placements, commercial mortgages, mezzanine transactions, private equity, and venture capital. Some of the benefits of relative value analysis and illiquid assets are intertwined: we might believe that our ability to evaluate and negotiate private placements provides excess return in relation to publicly traded bonds while also enhancing diversification of credit risk. If we are right in such judgments the majority of times while limiting the size of our bets, we will add value while actually reducing risk.

The yield premiums provided by the market for some illiquid instruments has declined; investment and commercial banks have used securitization and other structures to make previously illiquid investments and risks more liquid, and therefore cheaper to the borrower or risk transferor. Prime examples include asset-backed securities and commercial mortgage-backed securities.

Fortunately, the universe of illiquid investments has been expanded by the availability of asset swaps, which transform assets that are cheap but not directly suitable for the investor into assets that are suitable. In Europe, the publicly traded market for credit risk is less developed than in the U.S. For example, I once bought an asset swap that a dealer created by acquiring a cheap European Currency Unit-denominated zero-coupon bond issued by, and convertible into the stock of, a European company and overlaying a swap that converted the bond into a U.S. dollar-coupon bond. We got an attractive, though illiquid, bond, and the dealer was able to strip out a valuable equity option cheaply.

A third source of excess return is to increase the overall level of credit risk while taking care to diversify the risk broadly by sector, industry, issuer, location, and property type. In the same process, the insurer may broaden the sources of credit risk to include new markets, for example, foreign industrialized and emerging market debt and equity issuers, and new kinds of risk, such as catastrophe risks. The level of this incremental risk can be actively managed within the prudent category and overall limits, permitting revision of the level of exposure when indicated by the relationship of spreads to prospective market-wide and industry risk. An insurer can hit a big home run and avoid pain, first by being under-weighted in an asset class, like junk bonds or real estate when those assets are experiencing a cyclical downturn, and then accumulating those assets at distressed prices when competitors are trying to lighten their exposures.

Swaps and structured notes providing the total return on an asset class offer a potentially attractive method of participating in some of these asset classes and risks. A total return swap or structured note may provide economies and other advantages over hiring an outside manager or creating in-house capabilities. Even a large insurer might find it difficult to justify building in-house capabilities of a quality necessary to compete with other providers. In some markets, dealers have a natural motivation to pay the total return on an index to hedge a long inventory in the underlying assets; dealers may also enjoy valuable advantages in a market or country, some of which can be shared with a counterparty.

A fourth source of excess spread (or at least higher nominal yield) is to take interest rate risk, for example, by lengthening the maturity structure of assets and/or buying more callable bonds or mortgage-backed securities in relation to the liability-replicating strategy. Duration-neutral bets can be made by matching a liability "barbell" with an asset bullet or vice versa. Such bets can be a permanent portfolio strategy or a temporary adjustment reflecting a specific market view. In either event, they should be subjected to "what-if analysis."

Suppose that an insurer determines that moderate duration mismatches and option exposures represent prudent and attractive sources of additional spread and is prepared to take on such exposures by adjusting its investment portfolio. Why not consider using interest rate derivatives to accomplish the same purpose at lower cost and greater liquidity? Unfortunately, the industry and its regulators are not yet comfortable using derivatives to replicate an otherwise acceptable cash market strategy. One valid concern I have heard from Larry is that such replication could be hard to observe and track unless it is clearly disclosed on the statutory reports.

A fifth source of excess return is to include asset classes with equity-linked returns, including stocks, convertible bonds, mezzanine deals, and real estate equities. Used in moderation, such asset classes have the potential of enhancing long-term average returns while reducing near-term operating income and increasing the volatility of results. When allocating such risky assets, insurers consider their capacity to bear downside risk to earnings, surplus, rating agency measures, and other outcomes.

Derivatives and structured notes now broaden the menu of tools for achieving equity exposure. Besides the total return swaps noted above, insurers can acquire downside-protected exposure to equity indexes, enabling them to acquire more upside potential with less downside risk. Such structures may require less regulatory and rating agency capital than would outright equity exposure.

In considering how best to implement any of these sources of improved risk-adjusted spread, we determine whether the strategy is suitable in the cash market, and whether it should be considered and permitted in the derivatives market. What matters is what risks are assumed and how they are measured and managed, not where they are assumed. The caveat is that with derivatives, as with power tools, a company should take the precaution of having a “skilled operator” and “safety rules,” as proposed in the Group of Thirty Report.

Hedging the Liabilities

Let’s turn to hedging the unwanted characteristics of the liabilities. It is common to think of derivatives strategies as hedging either assets or liabilities, and this choice has important GAAP, regulatory, and tax accounting implications. Products like single premium fixed deferred annuities give customers free partial withdrawal and surrender options that create spread and disintermediation risk in rapidly rising interest rate scenarios. To offset some of this risk, an insurer might buy options as a liability hedge. Such options could also be considered as part of an investment strategy designed to manufacture (replicate) the benefits required by the liability over various interest rate scenarios while permitting the insurer to earn more stable spreads; if interest rates rise over a sustained period, the insurer needs to boost portfolio yields in order to support a sufficiently competitive renewal rate to avert high surrenders.

One common hedge providing such a yield boost is interest rate caps, which are bundles of yield options or “caplets,” each with its own reset date. Caps pay revenue at each reset date (usually semiannual, quarterly, or monthly) if the rate index is higher than the cap or strike yield; the payoff is product of: (1) the amount by which the rate index is higher than the strike, and (2) the notional amount, adjusted for the length of the rest period. To limit cost, insurers usually buy out-of-the-money caps with strike yields 2–4% higher than prevailing rates. Insurers usually buy caps indexed to the five-, seven-, or ten-year Treasury or swap rate because those rates are correlated with the new money rate offered by customers. A “class year” of annuities is most vulnerable to surrender when the surrender charge wears off. Accordingly, insurers sometimes buy caps for delayed start, taking effect when they are needed.

A similar and more liquid hedge is a put or “payer” swaption (short for “swap option”), which gives the owner the right, but not the obligation, to enter into a swap at a future date (the expiration date of the option). It is called a payer swaption because, if it is exercised, the insurer will be paying a fixed rate (the strike rate) and receive the London Interbank Offered rate (LIBOR). Put swaptions may be structured to allow the owner to unwind at market value prior to expiration or to cash settle at expiration. This flexibility makes the put swaption an interesting

alternative to a cap structure or individual caplet, particularly when used as an asset hedge by an insurer intending to let lapses rise and hedge the loss on bonds sold.

A third alternative is a family of interest rate swaps in which an insurer pays either a fixed rate or LIBOR and receives a constant maturity Treasury (CMT) or swap rate, typically a five-, seven- or ten-year maturity. While the inclusion of such swaps doesn't literally defease the withdrawal or surrender options, it permits the portfolio yield to adapt more quickly to changes in market rates, enabling the insurer to pay more competitive renewal crediting rates when interest rates rise.

With a constant maturity treasury (CMT), the insurer invests the money in a strategy designed to support the payment obligation. If obligated to pay fixed, the insurer will buy fixed-rate investments that may be illiquid, perhaps commercial mortgages. If the obligation is to pay LIBOR, the insurer will buy mostly floating-rate assets. Just as insurers sometimes buy assets with maturities and durations that are longer than those of the respective liabilities in order to earn incremental term premium, they might elect to cover the LIBOR obligation in part with short, fixed maturities to earn a term premium over LIBOR.

Why Aren't More Insurers Using Derivatives?

I agree with the points made earlier on this question. Implementing a sound asset/liability management and derivatives capability and getting the right level of informed top management involvement can be difficult and elusive. Recent adverse publicity about derivatives has been a setback to the process of initiating financially unsophisticated constituents. But there is a more fundamental gap that is just beginning to be filled by the cash-flow testing process and the consideration of the prudent person version of the model investment law—the need for a more realistic and holistic model and process for measuring, reporting, evaluating, and regulating the risks assumed by an insurer.

The existing reporting methods, pigeonhole regulations, and even the risk-based capital formulas still constitute a coarse and piecemeal approach that fails to capture outcome risks with adequate precision. By gaming their balance sheets to limit usage of risk-based capital, insurers are not limiting risk with nearly the effectiveness that would be afforded by taking cash-flow testing to the next level of sophistication, requiring standardization and possibly external certification, and basing required capital and rating analyses more directly on the pattern of results. The additional cost to the insurer should be more than offset by improvements in the management of return and risk and expansion of the permitted level of premium, in recognition of good risk management practices. In fairness to smaller companies, this innovation could be optional rather than mandatory.

Mr. Larry M. Gorski: The most common concerns expressed by regulators about insurance company use of derivatives are really threefold. One, we're concerned about inappropriate use of derivatives by unknowledgeable management. We're also concerned about managements that probably know what they're doing, but on the other hand, are willing to bet the bank on highly leveraged transactions. Lastly, we're concerned with our own inability to distinguish between sound and unsound use.

There are still some regulators who would probably wish that insurers didn't use derivatives at all, but that number is dwindling and that's through the efforts of sessions like this, and, even more appropriately, sessions held by the NAIC over the last couple of years. There have been a significant number of one- and two-day seminars devoted strictly to derivative instruments. I would say the general understanding of derivative instruments by the regulatory community has increased tremendously and as that understandably has increased, I believe our willingness to deal with companies who enter derivative transactions has also increased.

As probably most, if not all, of you know, the NAIC has just adopted the so-called pigeon-hole Model Investment Law. The official title is, "Investments of Insurers Model Act, (Defined Limits Version)." I don't think that the pigeon-hole version has any real limitations on an insurer's use of derivatives for either hedging or income generation purposes. The limit that is in the model investment law with respect to options, caps, and floors purchased is that their statement value cannot exceed 7.5% of the insurer's admitted assets. As you all know the cost of an option or a cap is very small, so this limit is quite liberal. For options, caps, and floors written, the limit is somewhat stricter at 3% of the admitted assets. When we get to collar, swaps, and forwards and futures, where we don't have either a premium paid or a consideration received, the limit is expressed in terms of potential exposure. Potential exposure is a formula that's defined in the law. It is a three-parameter formula that considers notional amounts, the time remaining under the contracts, and a risk factor that varies with the type of contract and is related to the volatility inherent in the underlying asset.

These limits were set with the intention of allowing companies to hedge a good portion of their investment-related risk. I don't believe they impose any real limitation on an insured's use of derivatives. There's one other limit that has to do with counterparty exposure inherent in OTC transactions. Basically all we're saying there is that when you determine your exposure to any one credit counterparty from a credit standpoint, you include with that your counterparty exposure as defined in the statute.

If derivatives are used for either hedging or income generation, the pigeon-hole approach does not present stringent limits. The real limitation is that the pigeon-hole approval prohibits the use of derivatives for replication purposes. When I refer to replication, I'm talking about a transaction in which an insurer holds a cash market instrument, say a high-quality corporate bond, and enters into a swap transaction to swap out the coupons for the total rate of return of a junk bond portfolio. In effect, the combination of these two transactions duplicates or replicates the performance of the junk bond. Both the pigeon-hole version and the prudent person version prohibit this use for derivative transactions. The reason is quite simple. It's not that we think these transactions are intrinsically bad, but that the risk-based-capital framework, as now constituted, does not deal with these transactions in a reasonable fashion. The insurer would set up the risk-based capital for the high-quality corporate bond, and set up risk-based capital for the counterparty exposure on the OTC instrument, but the risk-based capital would not capture the risk exposure related to the total rate of return on the junk bond portfolio.

So that's the major problem we're facing. There is a group of interested persons working with the NAIC Invested Asset Working Group to address four issues related to replication transactions: (1) accounting for replication transactions, (2) reporting of replication transactions, (3) asset valuation reserve, and (4) risk-based capital considerations. The project is expected to be completed some time next year. When that happens, I expect the limitation or prohibition against replication transactions in the pigeon-hole versions to be eliminated. The prudent person law has a built-in sunset provision associated with the prohibition. The prohibition terminates when and if the NAIC adopts the framework that I just discussed.

The project is not a simple one to complete. I'd like to just briefly go over some of the issues that we're struggling with. We're focusing now on replication transactions and for purposes of this discussion I will focus on a transaction where the insurer owns a high-grade corporate bond and enters into a swap transaction. Should that hybrid transaction, the replication transaction, be filed with the Standard Valuation Office (SVO)? The SVO has historically been the arm of the regulator that performs an independent evaluation of the credit quality of an instrument. Because the insurer is, in effect, taking on junk bond exposure, should the SVO be involved in the process in evaluating the credit quality of that transaction? Should the component pieces or the replicated unit be reported in the annual statement? Will the recognition of derivatives used for replication purposes cause a need to change any of the financial ratio tests used by regulators? We have many financial ratios that we use, in addition to risk-based capital. The financial ratios are triggered by junk bonds, mortgage loans, equities, and a myriad of other factors. Will those ratios have to somehow take into consideration these replicated units?

Should replication transactions be given any special recognition or treatment in asset adequacy analysis performed by the valuation actuary? If one views the replicated unit as the real investment of the company, and that investment is being allocated to a specific line of business, one needs to model that replicated unit. Until now, the modeling of derivatives transactions has been at an unsophisticated level. In many cases, we still see actuaries who use a "waving of the hand argument" when it comes to modeling derivative instruments. Last, will the procedures be sufficiently robust to deal with new and ever more complex arrangements? This is the age-old question that regulators deal with. We set a framework and we develop rules for that framework. Then new instruments come along that, in effect, get around the rules we've established.

Mr. Michael J. Streck: What about resource allocation for those companies currently not doing derivatives?

Mr. McAvity: I guess my feeling is that the first step is to tackle the asset/liability management challenge. The derivatives aren't the important part. The derivatives are just tools for sculpting or shaping future outcomes, but there's no point in fiddling with them too much until you have some ability to visualize future outcomes and have buy-in by the management team that it cares about those outcomes and agrees on how to measure them and understand the assumptions and what decisions we're making that influence those outcomes. That's step one and that's something that I think is a core mandate for any insurance company, large or small, or they shouldn't be in the business.

Mr. Lee R. Lambert: My question is for anyone on the panel. Many of the derivative transactions that are done could also be done just by changing the underlying assets. I'm asking how much of the derivative activity is because of transaction costs or taxation as opposed to changing the actual nature of the risk involved?

Mr. Burnett: I would hesitate to guess any particular percentage. But I think as evidenced in some of the strategies that were presented, it is a decent percentage in terms of the tax implications and considering the liquidity costs of transferring assets. To take it a step further, even for duration shifting, it is the more efficient way of managing that issue than buying and selling assets regardless of the ultimate tax implications. Certainly for institutions continually frustrated with matching gains and losses and wanting to make economic decisions in a pure sense, without having to worry about the resultant gains and losses, derivatives definitely are the means by which they can get their cash flow or duration positions without having to transfer the assets.